CLASSIFICATION C-O-N-F-I-D-E-N-T-I-A-L

CENTRAL INTELLIGENCE AGENCY

# INFORMATION REPORT

REPORT

CD NO. 25X1

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| COUNTRY | USSR (Abkhazskaya ASSR) | DATE DISTR. | 24 May 1955 |
| SUBJECT | Atomic Energy Institute at Sinop Headed by Manfred von Ardenne | NO. OF PAGES | 13 |
| PLACE ACQUIRED | | NO. OF ENCLS. (LISTED BELOW) | |
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Attached is is being forwarded as received. 25X1

Comments: 25X1

1. The name of the Soviet scientist given as Demirkhanov in this report appears as Demikhanov 25X1

2. In paragraph 9 of the attached report it is stated that a report on the development of a spectrometer, etc., was sent to the 9th Administration (sic) of the Ministry of the Interior in Moscow. Before 1949, however, all Soviet controlled research on atomic energy had been transferred from the 9th Directorate of the MVD to the First Chief Directorate of the Council of Ministers in Moscow. 25X1

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| ARMY | x | AIR | x | FBI | | OSI ev | x | AEC | x |

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CLASSIFICATION CONFIDENTIAL [redacted]

COUNTRY USSR [redacted]

TOPIC Atomic Energy Institute at Sinop Headed by Manfred von Ardenne

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EVALUATION [redacted] PLACE OBTAINED [redacted] 25X1

DATE OF CONTENT [redacted]

DATE OBTAINED [redacted] DATE PREPARED 13 January 1955 25X1

REFERENCES

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PAGES 4 ENCLOSURES (NO. & TYPE) 4 - four sketches, with legend

REMARKS 25X1

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General

1. The Sinop institute is located 2 km south of Sukhumi, east of the highway and the single-track railroad line both leading from Sukhumi to Tiflis, and at about 6 km distance from the institute of Professor Hertz. The institute covered an area of 1,000 square meters, the highway and the Sukhumi - Tiflis railroad line formed the western boundary of the compound. The western portion of the area was covered with sparse wood while the buildings were located in the eastern portion. The main institute building was a massive three-story building containing laboratories and Ardenne's apartment. East of the main building was a smaller one-story building housing the ultracentrifuge. Another fenced-in building located in the southeastern portion of the compound housed the separating magnet. The long workshop building was situated in the southeastern corner and contained the laboratory of the Soviet engineer [redacted] 25X1

2. The following equipment was found at the institute:

   1 mass-spectrograph
   1 ultracentrifuge
   1 cyclotron
   1 electronic microscope
   1 mass-spectrometer
   1 separating magnet

The fact that Professor Thiessen manufactured nickel foil diaphragms may serve as a clue about the aim of the institute.

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All component parts for the manufacture of ultracentrifuges as well as of ion sources were produced at the institute itself.

3. All materials required at the institute were brought by air from Moscow. Other means of transportation were the single-track Sukhumi - Tiflis railroad line and the bus line along the Sukhumi-Agudzera highway. No information was available about the nature of the materials supplied.

Since 1948, electric power was delivered along an underground cable from a power station located in the Caucasus Mts. This institute moreover had its own power station equipped with a Diesel unit of American manufacture.

4. During the time of observation, Beria, the then Minister of the Interior and his deputy Sweryev made inspection trips to the institute at least four times a year. Beria's visits were particularly frequent in 1949, possibly due to the fact that, at this time, development and research work at the institute had reached a stalemate. [redacted] 25X1

5. The working time at the institute was from 0800 to 1700 with an one-hour break at noon. In case of urgent work, Sunday shifts were worked.

6. Several of the scientists had to travel in connection with their work. Ardenne and his secretary Frau Suchland repeatedly went to Moscow. Professor Thiessen and Dr. Steenbeck made several trips, some of them to Leningrad where a similar institute is located.

7. <u>Demirkhanov's Laboratory</u>

Demirkhanov was a Soviet physicist, a theorist, who was said to be a descendent of an Armenian noble family and to have been educated in France. He is an anti-Bolshevist, pro-German, and an amiable character.

8. The laboratory covered a 12x10 meter floor space and was located in the eastern portion of the workshop building. The following equipment was found in the laboratory:

   various switchboards,
   laboratory tables,
   1 small lathe of Soviet make,
   various mechanic's tools,
   various voltmeters of up to 10,000 V,
   various microammeters, ranging from 0 - 3,
   1 Cambridge-Westinghouse measuring bridge,
   1 speedomac manufactured by General Electric, and
   various measuring bridges.

9. Both the Hertz institute and the Sinop institute did competitive work on the development of a mass-spectrometer. After two years work, the first mass-spectrometer was completed in 1949 and proved adequate in the first test run.

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Demirkhanov sent an elaborate report on the development of this spectrometer and the results obtained in the test run to the 9th Administration of the Ministry of the Interior in Moscow. [redacted]

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10. The following details of the electrical equipment of the mass-spectrometer were obtained: [1]

The electrical parts were encased in a box 180x150x60 cm in size, made of duralumin sheets. The front plates were 2 mm thick, the side plates 1 mm. The whole installation had a voltage of 225 V and reached $10^{-6}$. The following further details were available:

a. The high frequency source had a 2,000 V voltage and an output of one to two $10^{-3}$ ampere. The stability of the exhaust tension was $10^{-4}$.

b. The direct-coupled amplifier was of the conventional type. A highly resistant first stage may be mentioned as its special feature. The input governing tube was a button type tube, presumably of type 953 or 954. The operating data were anomalous: the installation operated with an anode current of 18-20 milliampere and a heating current of 90 -100 milliampere.

In order to avoid grid current, the control grid was short-circuited to the cathode, while the screened grid was used as control grid, in order to keep the grid cathode capacity at a low level. By this procedure, photoelectric effects and atmospheric disturbances were eliminated.

Before insertion, the tube was carefully cleaned with alcohol and handled with a pair of pincers, since it had become obvious that that faulty measurements resulted if the tube was touched with the fingers. Screened cables of low capacity led from the first stage to the subsequent stages.

c. An alternating-current amplifier with an oscillating condenser of American pattern was developed for the direct-current amplification.[2] Work on this project reached only preliminary stages. It became obvious that this type of oscillating condenser required a most careful construction. High-grade insulating material such as amber was used and the use of ceramic material was planned. The condenser surface was gold-plated in order to eliminate contact potentials. The condenser was excited by 1,000 cycles/second. No further details were available.

Within the framework of the development of the electrical outfit, source made the following switching arrangement:

With the aid of a speedomac operating with 18 thyratrons and 18 relays, the values of the incoming isotopes were determined logarithmically. When the peak values were reached, the measuring set, with the aid of the relays, switched over to linear determination. [3]

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11. The spectrometer tube was made of electrolytic copper and bent to a predetermined angle. [redacted] 25X1
[redacted] The sketch attached in the Annex indicates approximative values for them.[4] 25X1

The curved portion of the tube was slightly flattened out. This portion lies within a variable magnetic field of undetermined strength. Using a 1,000 ohm resistance of the magnetic coil and a 500 V tension, it was possible to regulate the magnetizing current between 0 and 300 milliampere.

Flanges were hard-soldered onto both ends of the tube. The soldering procedure was done with the aid of a high frequency generator. The lower flange was screwed to a cylinder of electrolytic copper which encased the ion source. The upper flange ended in a jar (A) housing the amplifyer. The collector protruded into the tube. A screen with a very fine slit was posed in front of the collector so that only specific mass elements could reach the collector. The latter had a 10-20 V potential to earth. The spectrometer tube as well as the cylinder housing the ion source workedunnder high vacuum which was considered adequate if the vacuum of the upper jar amounted to $10^{-2}$ mm Hg.

12. In Demirkhanov's laboratory work was done with uranium hexafluoride. [redacted] great difficulties were encountered in the experiments to evaporate uranium, and that Ardenne considered the possibility of overcoming these difficulties by electronic bombardment. It is not known whether this project was realized or not. 25X1

1. [redacted] Comment. For setup of the electronic section of the mass spectrograph, see Annex 1. 25X1

2. [redacted] Comment. For diagram of the direct current amplifier, see Annex 3. 25X1

3. [redacted] Comment. For graph of the isotope values, see Annex 2.

4. [redacted] Comment. For sketch of the spectrometer tube, see Annex 4. 25X1



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Annex 1

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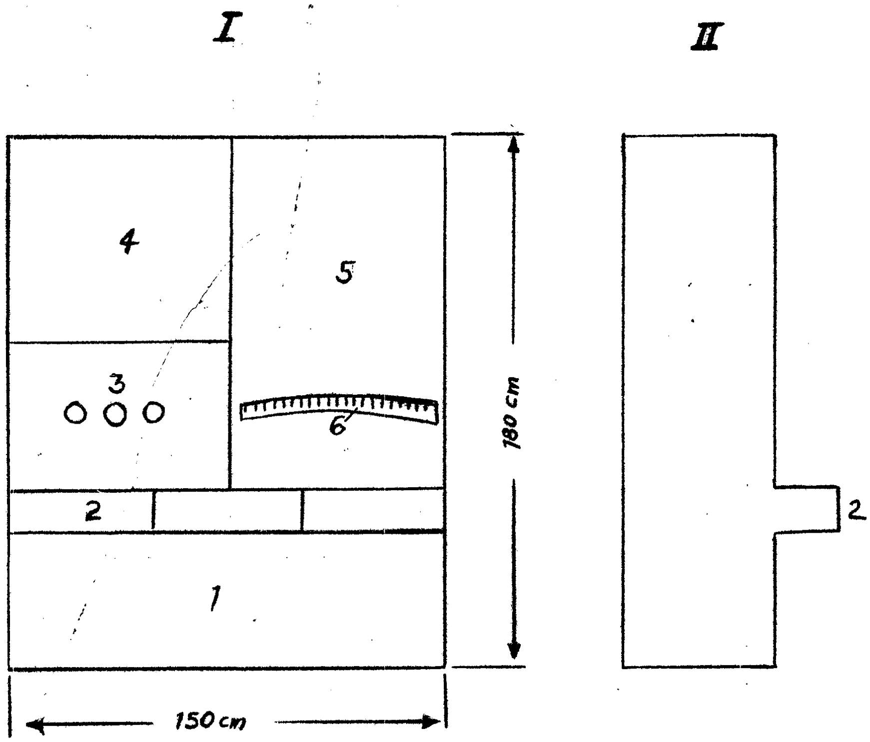


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Annex 1 [redacted] 25X1

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Setup of the Electronic Section of the Mass Spectrometer.

I. Top view

1 - High frequency source with stabilizer

2 - Desk

3 - Decade adjustment

4 - Emission stabilizer

5 - Direct-current amplifyer

6 - Scale

II. Side view

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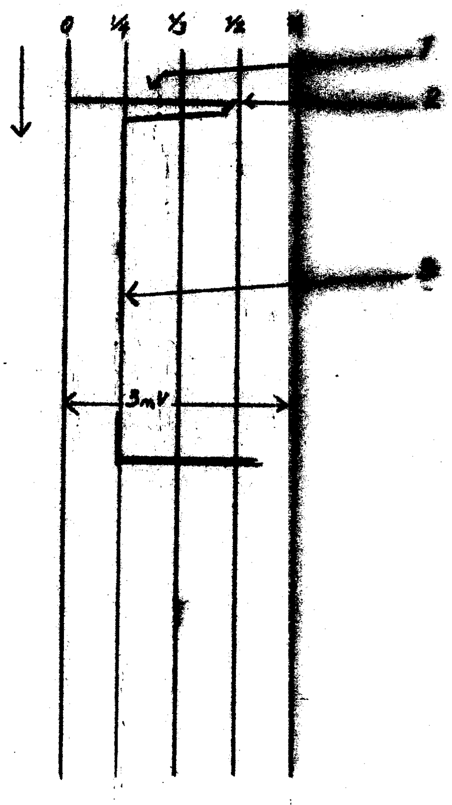


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Annex 2 [redacted] 25X1

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Recording of Isotope Values

1 - Logarithmic recording

2 - Change-over

3 - Linear recording

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Annex 3 [redacted]



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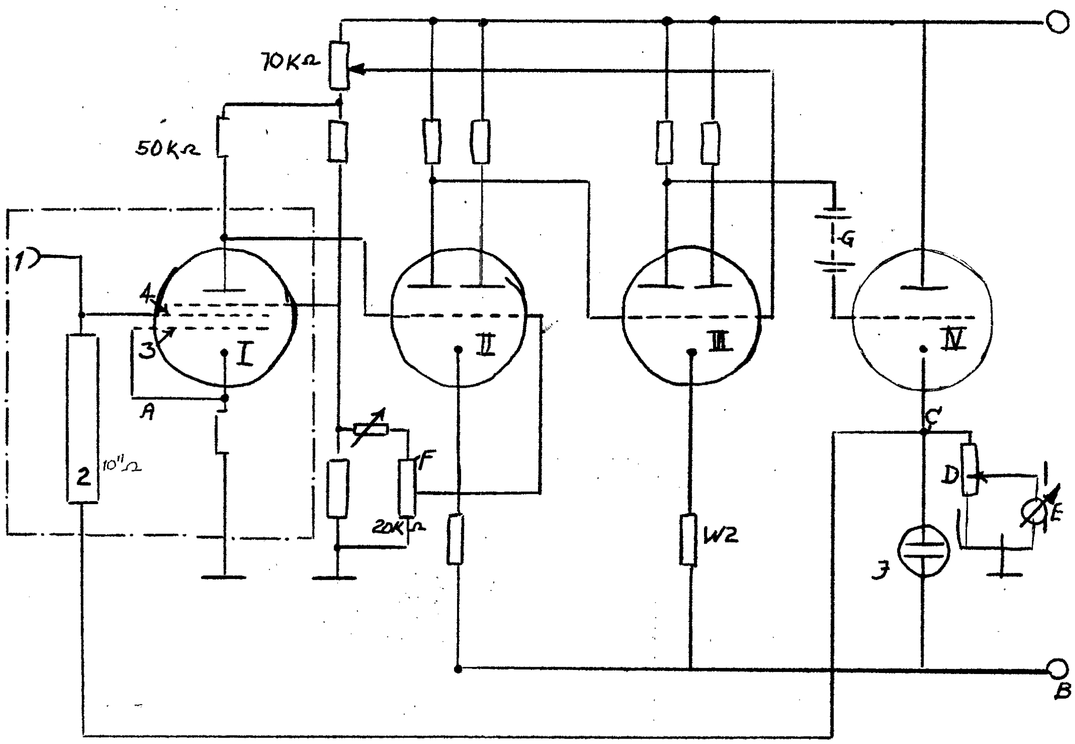


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Annex 3 [redacted] 25X1
[redacted] 25X1

## Design and Operation of the Direct-Current Amplifier

1 - Collector

2 - Highly-resistent resistor

3 - Screengrid

A 220 V voltage was found between points A and B.
A possessed + 120 V to earth, while B had - 100 V.

C had a ground potential.

D was an adjustable resistor operating in stages and connected to the galvanometer E. At this point D it is possible to provide for a stable transmission ratio.

The amplifier was adjusted with the aid of the potentiometer F in such a way that point C had earth potential when the amplifier was in static condition.
With the aid of the slide battery G it was possible to diminish the potential of point H to the required grid potential.
The resistors $W_1$ and $W_2$ were determined empirically and provided cathodes II and II with the required potential.
The glow lamp I protected the cathode potential of tube IV.
With the exception of the glow lamp, all valves were duodiodes.
These duodiodes were used in order to be able to compensate for changes occurring during the emissions which might have created a critical situation.

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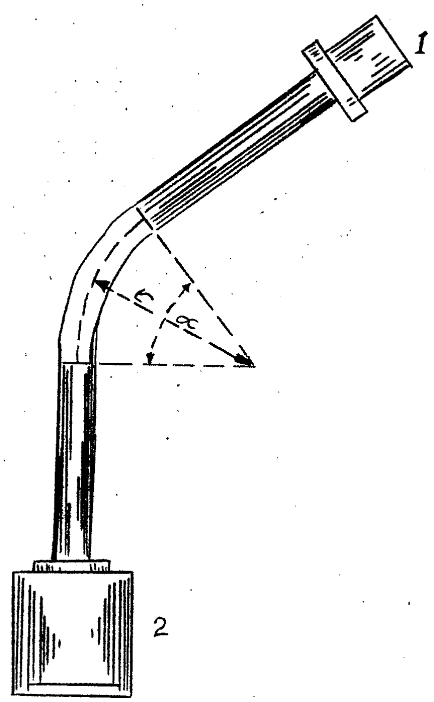
Annex 4 [redacted] 25X1

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Annex 4 [redacted] 25X1
[redacted] 25X1

Spectrometer Tube

1 - Upper flange housing the direct-current amplifier

2 - Ion source encased in the cylinder screwed onto the tube.

$\alpha$ angle of curvature )
) values undetermined
r radius of curvature)

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